

Bank Failure

In the face of increased migration of natural functions from urban areas where development occurs to compensation sites in the countryside, the new wetlands mitigation rule probably goes as far as current policy can take the ecosystem services concept. The work ahead will require a research-based understanding of the ecology, economics, and geography of wetland services

J.B. Ruhl, James Salzman, and Iris Goodman

It may seem unsympathetic to ask the Corps of Engineers, just months after it and the Environmental Protection Agency finalized a massive, years-long joint rulemaking on compensatory wetland mitigation, what it plans to do next. But as anyone versed in environmental law knows, publishing a final regulation marks the closing of one chapter and the opening of another, and it is the job of the Corps to implement rules it promulgates jointly with EPA.

There is much to be done. Here we consider just one of the important tasks — the requirement that “compensatory mitigation . . . should be located where it is most likely to successfully replace lost . . . services.” It is easy to overlook this brief passage in the 210-page *Federal Register* document, but it is potentially of great significance and could transform how compensatory mitigation is carried out. In short, mitigation requirements are being met through created or enhanced wetlands in rural ar-

reas, removing these important resources from the population centers that need them for vital services like flood prevention. The new rule could change this “mitigation migration” trend.

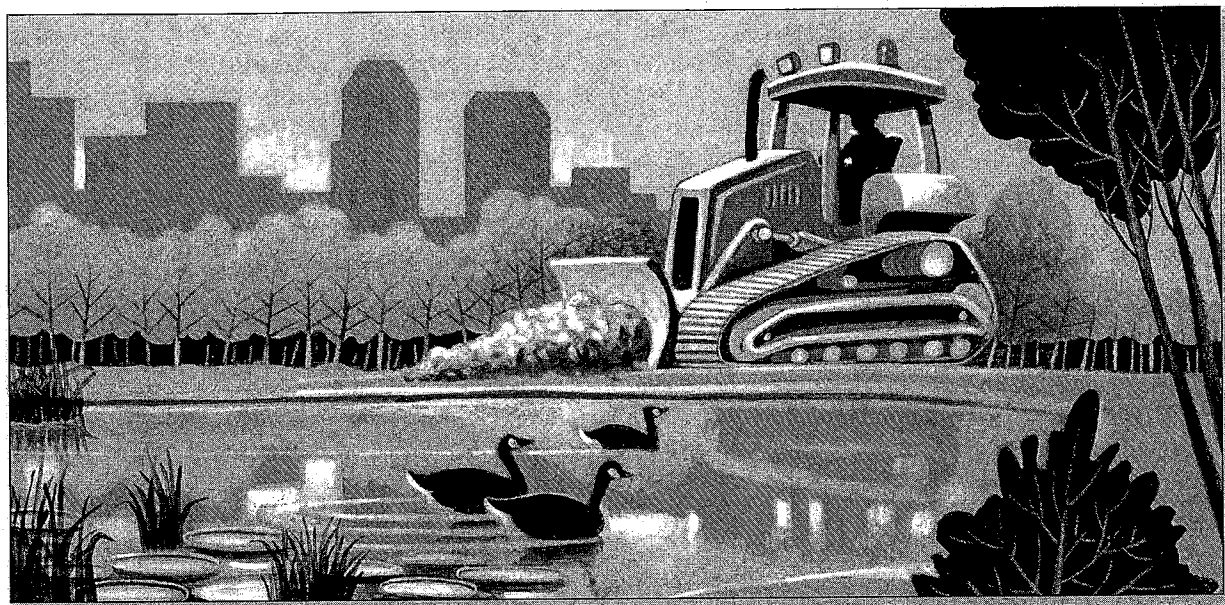
When a development project involves filling wetlands regulated under Section 404 of the Clean Water Act, the Corps must issue a permit authorizing the activity. The permit usually requires mitigation for the loss of wetland functions. Permittees traditionally have accomplished this mitigation themselves directly through creation or enhancement of wetlands on site or in an offsite location, or by paying a fee to fund mitigation by a third party. Wetland mitigation banking, which arose in the mid-1990s, provides a variation on offsite mitigation by allowing the developer to compensate for the resource loss by purchasing credits from another landowner — the wetland banker — who has created or enhanced wetland resources elsewhere.

Although mitigation banking began mainly as a means for state highway departments and other government agencies to satisfy their regulatory needs by establishing their own banks, several hundred entrepreneurial banks now operate in the nation, selling credits within defined boundaries to private and public developers. Banking today accounts for over 30 percent of all mitigation carried out under Section 404 nationwide.

Policy discourse on compensatory mitigation was for many years primarily biocentric in focus — how did the different methods compare ecologically, were the agencies adequately ensuring replacement of lost wetland functions, what assessment methods best captured habitat function? But wetlands provide economically important services to human



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populations as well, not just flood mitigation but also groundwater recharge, protection from storm surges, water filtration, and sediment capture.

Yet, while these benefits unquestionably are of economic value if measured in terms of the adverse impacts were they removed (such as damages from flooding) or the cost to replace the benefits with technological substitutes (such as the cost of seawalls), the stream of benefits from wetlands is usually not valued in the marketplace. The real estate value of coastal wetlands, for example, rarely includes the benefits of storm surge buffering. Landowners cannot easily charge for the offsite flood or pollutant mitigation benefits flowing from wetlands they own, making the services a positive externality that appears free for the taking to other landowners who benefit from them. And even if landowners could charge for the services provided, pricing would be difficult because of the complex ecological and geographic attributes of ecosystem services. Consequently, a landowner's decision about whether to convert wetlands to other uses is unlikely to take into account their service value to others.

Focusing on mitigation banking in particular, a series of research articles has widened the policy debate on compensatory mitigation to include questions about the distribution of ecosystem services to humans. Two articles from ELI's *National Wetlands Newsletter* bookend the series. In 1997 Dennis King and Luke Herbert showed that the aggregate effects of mitigation and permitting decisions in Florida had led to a "migration" of wetlands and their services from cities to the countryside. Almost 10 years later,

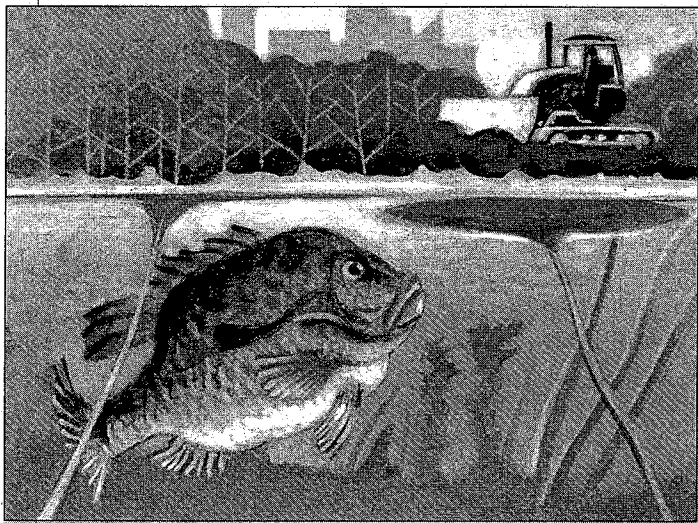
J.B. Ruhl and James Salzman presented the results of a detailed geographic study of all wetland mitigation banks in Florida and the impact sites that purchased credits from them, showing the effect King and Herbert identified. Indeed, the migration of wetlands across the urban-rural divide appeared to be spreading, with mitigation sites on average over 15 miles from impact sites.

This and similar research raised the question of whether, even if this shift in wetland distribution is ecologically neutral for nature (itself a hotly debated question), it is economically neutral for humans. The possibility that the compensatory mitigation program facilitated the migration of services from urban areas and concentrated them in rural areas suggested a "hot spots" problem that has plagued other environmental trading programs. Yet this is precisely what the research has begun to show — developers seeking to build in high-price urban settings find it economically advantageous to satisfy their compensatory mitigation obligations by restoring wetlands in low-price rural settings (or by paying someone else to do so). The inevitable result over time is the systematic stripping of wetlands from urban areas.

Some representatives of the wetland mitigation banking industry came to the defense of the practice in the face of these studies, but with little or no empirical backup. One argument, for example, was that urban wetlands are ecologically

stressed and isolated, of little value to wildlife. But that too-narrowly defines the suite of benefits wetlands provide, neglecting the potential economic values delivered through ecosystem services. What might not be attractive to a duck may nonetheless provide services to local urban populations. What services were being lost at urban impact sites is as relevant question as what value they provide to wildlife. The ecological productivity and habitat quality of a wetland area may or may not be proxies for services such as storm water mitigation, groundwater recharge, and thermal regulation.

Never fear, came the retort, for state and local regulations are there to ensure the replacement of vital services such as storm water retention. But are they? Do state and local governments inventory ecosys-



tem services and ensure all those supplied by urban wetlands are replaced? Moreover, this argument assumes that the different services a wetland provides are independent and can be unbundled and parsed out over the landscape without diminishing overall service value. Do small stormwater ponds tucked in the corner of an urban development really provide thermal regulation, groundwater recharge, sediment capture, water filtration, and other services in the same manner and degree as the wetlands they replace? If not, how will those services be replaced? The Corps's compensatory mitigation program did not address those questions, leaving it to state and local programs to fill in the gaps.

Who cares, was the ultimate response — if people want to trade crummy urban wetlands for shopping malls, let efficient land use rule the day. The suggestion is that it would be economically inefficient to preserve urban wetland services given the valuable alternative uses to which the land can be

converted. But as noted, people may not be aware of all that is gained and lost in that trade. If the effect on urban wetland services were made clear at the landscape scale, would people be so quick to discount their value? To be sure, adding ecosystem service values to the land use calculus is unlikely to make preserving urban wetlands the most economically advantageous option in all cases, but it will make a difference in many cases in terms of how development is designed and how wetland resources are measured.

The problem is that we do not truly know the answers to these questions, because the federal wetland program has never asked them. There is an absence of data regarding the scope and magnitude of the distributional effects associated with compensatory mitigation; no reliable empirical studies exist nor are relevant data generally available. Although ecological assessments of wetland impact and mitigation sites were required as part of the Corps's permitting process, ecosystem service assessments were not, and the former is not necessarily a proxy for the latter. A duck might not mind that a marsh has moved 15 miles, but humans might.

Some of the ecosystem services flowing from wetlands are primarily local in terms of who benefits from them. For example, research on the effects of the 2004 Asian tsunami shows that the presence of coastal wetlands significantly mitigated the nearby inland damage caused by the wave forces. Research from Florida has shown that wetlands help regulate local moisture and temperature. Even small wetlands in urban areas, it has been demonstrated, provide important pollutant control services to the local population. Hence, moving wetland resources, even within a bank's defined service area, is likely to alter who benefits from the associated ecosystem services.

Of course, urbanites might not care about this possible loss of services — that is, urban dwellers might very well prefer a shopping center to a wetland and might not mind losing the services associated with the wetland. But if they don't know what and where those services are and the values conferred, they can't make fully informed decisions. Indeed, the more pernicious problem is the cumulative effect — the loss of urban wetlands networks mounts over time, even as each site-specific loss seems inconsequential. Geospatial tracking of wetland impact and mitigation sites has not been a part of the Corps's program until recently, and thus very little is known about the landscape effects of compensatory mitigation on ecosystem services. In short, although everyone

knows wetlands provide valuable services and evidence demonstrates the compensatory mitigation program has migrated those services, the Corps's regulatory program has had no mechanisms for monitoring this effect and taking ecosystem services into account.

The new regulation is a great stride forward in this respect. Although motivated primarily by the need to bring order to the overall compensatory mitigation program, which had been run under a Frankenstein-like collection of guidance, inter-agency memorandums, and other policy documents issued over the span of 17 years, the new rule for the first time introduces ecosystem services into the picture. Initially, the rule adopts the term "services" to mean "the benefits that human populations receive from functions that occur in ecosystems." This recognizes that ecological functions, previously the sole focus of compensatory mitigation, support not only wildlife and other natural resources but also provide economically valuable benefits to humans. The rule then mandates that "in general, the required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services." Supporting that directive, the rule explains that "the success of compensatory mitigation for impacted habitat functions . . . may lead to siting of such mitigation away from the project area. However, consideration should also be given to functions and services (e.g., water quality, flood control, shoreline protection) that will likely need to be addressed at or near the areas impacted by the permitted impacts." Accordingly, Corps district engineers, when

What the Banks Value Most

The new compensatory mitigation rule is a great stride forward in a national policy to protect wetlands functions and values. The traditional crazy-quilt of wetlands policies (or lack thereof), the absence of uniform Corps of Engineers enforcement among its districts, and the failure to ensure that a number of issues such as temporal loss, proximity, financial assurances, long term management, like-kind mitigation, and functional equivalency have all been uniformly addressed as strong national standards in the new rule.

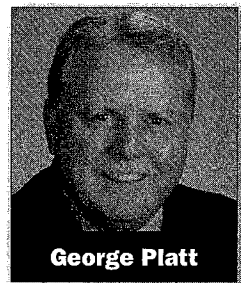
Mitigation bankers have been held to these standards and more for at least a decade and have established a remarkable track record of advanced mitigation in more than 500 permitted banks around the country. Thus, it is no mystery as to why the new rule reflects a preference for permitted mitigation banks. The National Mitigation Banking Association also supports a plan of seven "Key Elements" that can help the Corps to successfully implement the new rule (See Mitigationbanking.org).

The rule goes to great lengths to include science-based recommendations from the National Research Council, including a strong preference for watershed-based mitigation solutions. The rule also includes a continued assurance of sequencing before regulators permit any form of compensatory mitigation. Mitigation bankers strongly support these approaches as the best way of ensuring that all forms of mitigation meet equivalent, effective standards under the Clean Water Act. The new rule establishes a preference hierarchy for

mitigation options in order to reduce risk and uncertainty and help ensure that required mitigation is provided. This science-based approach was heavily vetted by the Corps of Engineers, EPA, and a panoply of professionals and organizations in the rule's four-year birthing. It is notable, therefore, that in the hierarchy of mitigation options, mitigation banking is deemed by the rule to be a preference when the impacts sought to be mitigated are in the service area of a permitted mitigation bank that has credits available.

Mitigation banks are performance based, as they are tied to demonstrated, successful achievement of project goals as articulated in the bank permit. Credits only become available for a bank to sell once these success criteria have been met. Thus, such "advanced" mitigation has inherent advantages when viewed by regulators who do not have the budget or the time to scrutinize every small on-site or off-site mitigation project.

Some states, such as Florida, also have regulatory regimes in place that address other ecosystem concerns (such as water filtration and sediment capture) as part of the overall permitting process for development. As mitigation bankers, we encourage continued study of how we can enhance our commitment to no-net-loss of ecosystem functions and values, including the lessons we can learn from those states that have been in the forefront on these issues.

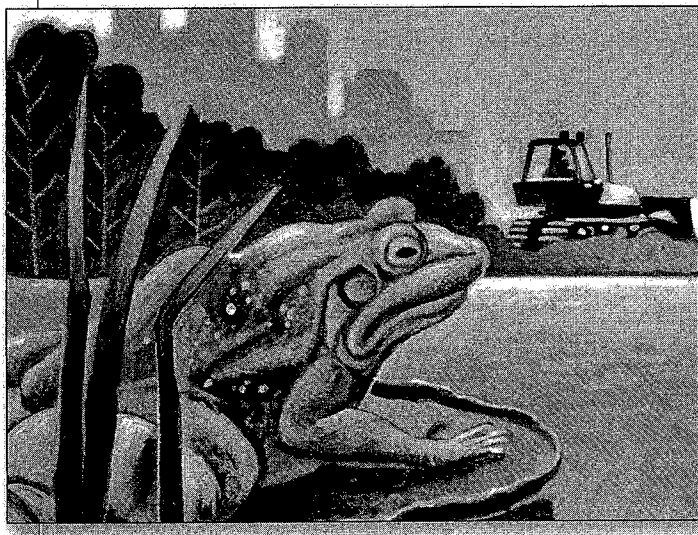


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making mitigation determinations, "may require onsite, off-site, or a combination of on-site and off-site compensatory mitigation to replace permitted losses of aquatic resource functions and services." EPA adopted an identical set of provisions in its part of the joint rule.

Although the impact on ecosystem services is just one of many factors the Corps must weigh in the compensatory mitigation decision under the new regulations, the integration of that factor into the rule enables EPA and the Corps to consider the issues arising from the migration of wetland services from urban to rural areas, as well as the question of how services generally should be factored into mitigation decisions. There is, however, no further detail in the rule to guide implementa-



tion of these requirements. In particular, the provision requiring permittees to develop mitigation plans does not require assessment of ecosystem services at the impact site as part of the baseline information the permittee must compile. On this point, the agencies explained in the rule's preamble that "although the services provided by aquatic resource functions are important to consider when determining the type and location of compensatory mitigation projects, there are few methods available for assessing services. Therefore, in most cases consideration of services will be conducted through best professional judgment." Yet the rule offers no additional guidance on what will inform this judgment or how the Corps will exercise it.

The sparse level of detail in the rule, however, by no means defines the limits of detail for the program as a whole or for the development and use of ecosystem service assessments. Just as the overall compensatory mitigation program evolved

over time prior to the rule through a series of inter-agency and Corps guidance and policy memorandums outlining standards and practices, so too can the ecosystem services component of the new rule be further defined and implemented. Indeed, in EPA's guidelines for its portion of the new rule, governing Section 404(b)(1), the agency states that "from time to time guidance on interpreting and implementing this subpart may be prepared jointly by EPA and the Corps at the national or regional level." In fairness, the rule probably goes as far as policy can take the ecosystem services concept at this time — the work ahead will require a research-based infusion of better understanding of the ecology, economics, and geography of wetland ecosystem services at local landscape scales.

The agencies unquestionably are correct that there are few methods available for assessing services, and they are wise not to write rules that demand more of them and permittees than the best available science can deliver. But this is by no means the first time policy and methodology have been caught in the chicken-and-egg dilemma. The science on wetland ecosystem services pushed the Corps to acknowledge the effects of compensatory mitigation on the distribution of ecosystem services, and now it is time for science to follow policy's lead. In the wetland mitigation program, for example, early assessments of wetland impact and mitigation were usually based on acres, with little attention to ecological functions. Over time, however, the Corps, EPA, and state agencies developed more refined functional assessment methods, allowing impact and mitigation evaluations to move closer to measuring true ecological losses and benefits. This example of co-evolution between policy and science defines an important first step for implementing the wetlands compensatory mitigation rule — building a more robust base of research and knowledge from which to develop methods for assessing wetland ecosystem services.

In an example of research that anticipated emerging management issues related to ecosystem services, in 2007 EPA's Office of Research and Development began planning such studies on wetlands as a major component of its Ecosystem Services Research Program, initiated independently of the new rulemaking. This research is providing a foundation to enable the assessment of a suite of core ecosystem services provided by freshwater and coastal wetlands. The core wetland ecosystem services under study include the biological integrity and wildlife habitat

provided by wetlands, which have long been valued in their own right by society. In addition, ESRP research is also developing methods to quantitatively assess other wetland services including flood control and storm surge protection; maintenance of water quality, including nutrient cycling; maintenance of water quantity, including recharge and baseflow; carbon storage and sequestration; support of fisheries; and other contributions to human well-being, such as recreational and cultural values. This research extends ESRP's previous work to develop ecological stressor-response models. In particular, ESRP's new wetlands research is designed to develop methods to assess the effects of pollution, infrastructure development, hydrologic modification, resource extraction, invasive species, climate change, and changing patterns of land cover and use on these core ecosystem services.

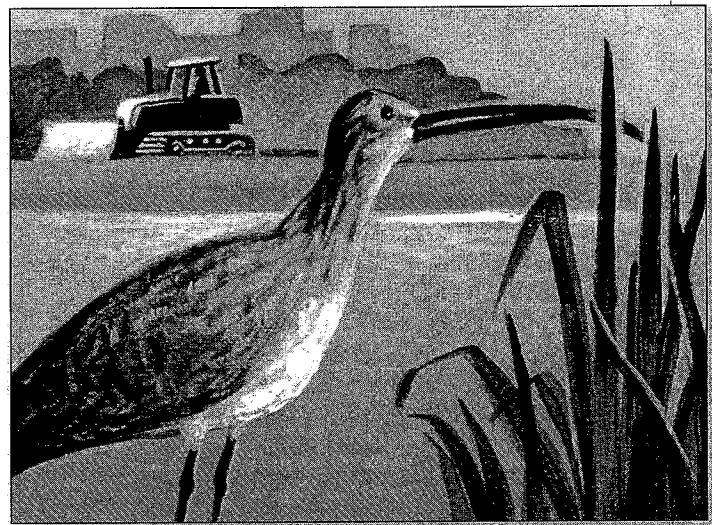
ESRP will conduct studies at wetland sites across the contiguous United States, including tidal and freshwater wetlands in portions of the Pacific Northwest, the coastal wetlands of the Great Lakes, the coastal wetlands of North and South Carolina, isolated wetlands in the Midwest, and urban wetlands in and near Tampa Bay. These studies will be conducted in collaboration with local communities, state resource agencies, EPA regional offices, other federal agencies, and ESRP research partners in academia and the private sector.

In order to enhance their comparability and extend their usefulness to resource managers, these studies will share common methods and products. These include developing ecosystem service indicators for wetlands, predictive landscape models that incorporate landscape profiles and wetland functional surfaces, atlases that depict the spatial distribution of wetland services, and tools to assess trade-offs among wetland ecosystem services, as affected by various stressors to these systems. A major objective of ESRP's research is to provide quantitative information on baseline services provided by wetlands, as well as methods for prospective scenarios of how these services may change, at site to landscape to sub-regional scales. ESRP's goal is to provide information about ecosystem services that will support innovation in resource management and private-sector investments in wetland stewardship and conservation.

It will be important, of course, to design a research agenda to produce wetland service assessment methods that the Corps can apply in permitting decisions efficiently, without undue time and expense, and reliably. As these methods come on line and are refined over time, Corps district engineers exercising best professional judgment

about impacts to services can move from basing decisions on generalized qualitative assessments to more site-specific quantitative assessments, which will make their decisions more transparent and legitimate. Moreover, the Corps and EPA can begin to integrate information collected on ecosystem services into aggregate geospatial databases on wetland mitigation, allowing regional assessments of wetland ecosystem service distributions.

We always must be mindful of not letting the perfect be the enemy of the good. Prior to the rise of mitigation banking, the principal method for a land development project to satisfy regulatory wet-



land requirements was to compensate for resource losses through on-site creation, enhancement, or preservation of wetlands. The result of this practice, compounded over thousands of land development projects, was an administrative nightmare for federal and state regulatory agencies administering wetland protection programs. Numerous retrospective studies have shown that individual project compensatory mitigation usually was poorly designed, inadequately implemented, and infrequently monitored. In mitigation banking, by contrast, the banker is more easily subjected to permitting standards and close monitoring and has an economic incentive to produce and sustain the wetland values needed to generate credits to sell.

Yet, far from discounting these advantages or suggesting that mitigation banking is inherently inferior to onsite mitigation, it is precisely these features of mitigation banking that suggest ecosystem service values could appropriately be integrated into compensatory mitigation. The good should, and can, be made better, and the new rule is a significant move in that direction. •